Assignment 9

In the following problems, the statement "determine the complexity of the language ..." means to determine for that language if it is: a. decidable, b. Turing-recognizable but not decidable, c. co-Turing-recognizable but not decidable, d. neither Turing-recognizable nor co-Turing-recognizable.

1. Consider the language ALL_{DFA} consisting of the string representations of all DFAs D such that $L(D) = \Sigma^*$ is the language of all strings in the alphabet (the alphabet defined by that D). Determine the complexity of this language.
2. Consider the language $L = \{\langle M, N \rangle \mid M, N \text{ are TMs and } L(M) \cap L(N) = \emptyset\}$. Determine the complexity of this language.
3. Consider the language $L = \{\langle M, w \rangle \mid M \text{ is TM and does not halt on } w\}$. Determine the complexity of this language.
4. Consider the language $L = \{\langle M \mid M \text{ is TM and } L(M) \text{ is decidable}\}$. Determine the complexity of this language. (Note: $L(M)$ being decidable is not the same as saying M is a decider)